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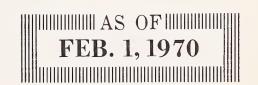


WATER SUPPLY OUTLOOK FOR MONTANA

FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE, and
MONTANA AGRICULTURAL EXPERIMENT STATION

Data included in this report were obtained by the agencies named above in cooperation with Federal, State, and private organizations listed on the inside back cover of this report.



TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1400 snow courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a continuous record of snow water equivalent at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 209, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS					
Alaska	P. O. Box "F", Palmer, Alaska 99645					
Arizona	6029 Federal Building, Phoenix, Arizona 85025					
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202					
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702					
Montana	P. O. Box 98, Bozeman, Montana 59715					
Nevada	P. O. Box 4850, Reno Nevada 89505					
Oregon	1218 S. W. Washington St., Portland, Oregon 97205					
Utah	4012 Federal Building, Salt Lake City, Utah 84111					
Washington	360 U.S. Court House, Spokane, Washington 99201					
Wyoming	P. O. Box 340, Casper, Wyoming 82601					

PUBLISHED BY OTHER AGENCIES.

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P O Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia

WATER SUPPLY OUTLOOK FOR MONTANA

and FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

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MONTANA WATER SUPPLY OUTLOOK

February 1, 1970

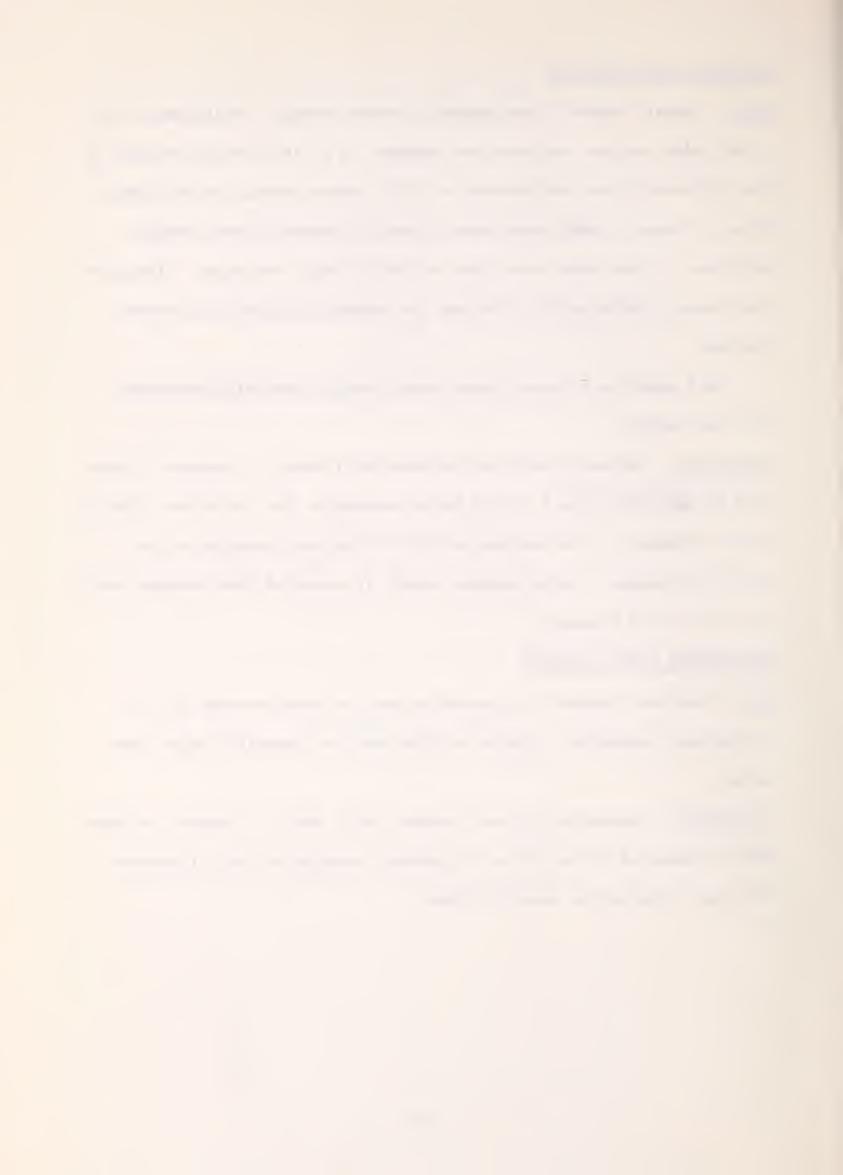
* Above average snowfall during January improved the * * mountain snowpack to near average over most of the State. * 1 * Snowpack in the Kootenai River drainage is well below average. The Gallatin River drainage snowpack remains well above average. * * * Mountain soil moisture is generally below average * * with the exception of the lower Gallatin drainage.

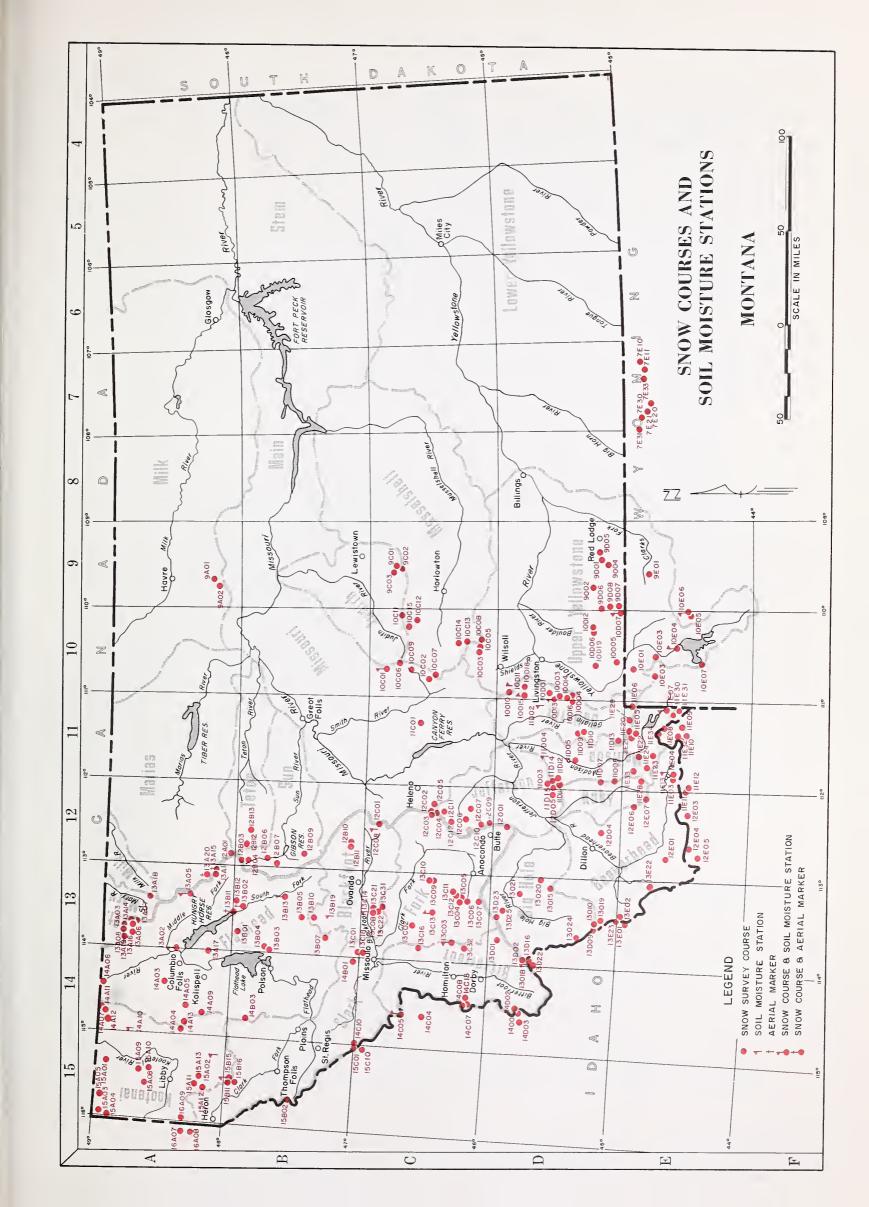
COLUMBIA RIVER DRAINAGE

Snow - The low elevation snowpack is generally below average. The high elevation snowpack is near or above average. Snow cover in the Kootenai drainage is about two-thirds average; the Flathead is a little below average; the Clark Fork is near average and the Bitterroot is a little above average.

All snow courses will be measured about March 1 and the distribution of snowpack by drainages and elevation will be analyzed to a fuller extent.

<u>Streamflow</u> - Present conditions indicate that streamflow during the spring and summer will be between 80 and 90 percent average on major streams.





INDEN to MONTANA SNOW COURSES and SOIL MOISTURE STATIONS

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SUMMARY OF SNOW MEASUREMENTS (COMPARISON WITH PREVIOUS YEARS)

	RIVER BASIN and/or SUB-WATERSHED	Number of Courses	THIS YEAR'S SNOW WATER AS PERCENT			
	MVEN BOTH GIOTI SOS WILLIAM	Averaged	Last Year	Average		
		•				
	KOOTENAI	7	60	62		
	FLATHEAD	6	60	82		
	CLARK FORK	9	66	94		
BITTERRO	BITTERROOT	2	78	111		
	JEFFERSON	7	49	94		
	MADISON	12	71	107		
	GALLATIN	12	122	154		
	MISSOURI MAIN STEM	4	46	80		
	YELLOWSTONE	5	78	99		



c	M	n	W
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DRAINAGE BASIN and/or SNOW COURSE NAME

Date of Survey

Snow Depth (Inches)

THIS YEAR

Water Content (Inches)

PAST RECORD Water Content (inches) Last Year Average

COLUMBIA RIVER BASIN

Elevation

<u>-</u>	SOLUTIDIA KI	LARK DWOT	14			
KOOTENAI RIVER						
Fernie	3500				11.8	7.1
Field	4200	1/29	18	3.2	4.7	5.5
Glacier	4100	1/27	56	14.3	19.7	20.5
Gray Creek	5100	1/30	32	7.0	12.6	12.4
Kicking Horse	5400	1/29	34	7.0	10.5	11.4
Marble Canyon	5000	1/29	30	5.1	11.3	10.6
Morrissey Ridge	6100	1/30	53	12.7	-	20.0
New Fernie	4100				-	11.1
Sinclair Pass	4500	1/29	17	2.9	5.5	4.7
Sullivan Mine	5100	1/29	30	6.6	14.2	9.7
FLATHEAD RIVER						
Desert Mountain	5600	1/30	36	8.9	15.9	10.7
Hell Roaring Divide	5770	1/30	63	13.9	28.1	22.3
Holbrook	4530	2/5	35	7.0A	11.0A	7.4
Marias Pass	5250	1/28	48	10.2	14.0	12.1
Spotted Bear Mountain	7000	2/5	49	10.0A	14.0A	
Twin Creeks	3580	2/5	42	8.5A	14.0A	8.7
CLARK FORK RIVER						
Black Pine	7100	1/30	31	7.8	13.6	8.8
Black Pine Pillow	7100	1/30	SP	7.9	13.0	8.8
Combination	5600	1/30	13	2.9	-	-
Coyote Hill	4200	1/30	34	7.8	10.1	7.8
Heart Lake Trail	4800	1/29	52	12.8	20.4	-
Hoodoo Basin	6000	1/29	118	33.1	44.7	-
Hoodoo Basin Pillow	6000	2/01	SP	32.6	-	_
Hoodoo Creek	5900	1/29	116	31.8	41.8	32.0
Intergaard	6450	2/03	22	3.9	7.1	5.3
Lookout	5250	2/01	88	24.5	38.7	25.0
Lubrecht Forest No. 3	5450	1/28	20	4.7	-	5.2
Lubrecht Forest No. 4	4650	No Sur	vey		-	2.7
Lubrecht Forest No. 6	4040	1/28	14	3.4	-	3.3
North Fork Elk Creek Pillow	6500				-	-
Southern Cross	6500	2/03	15	2.9	6.5	4.4
Storm Lake	7780	1/29	38	8.6	12.0	8.5
Stuart Mill	6500	2/03	17	3.2	6.8	4.5
Stuart Mountain	7400	No Sur	•		-	21.5
TV Mountain	6800	1/29	55	13.6	-	11.8

A - Aerial observation - water content estimated.

SP - Snow pillow observation - water content only.



SNOW			THIS YEAR	Y	PAST RECORD		
DRAINAGE BASIN and/or SNOW COURSE		Date	Snow Depth	Water Content	Water Content (inches)		
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average	
BITTERROOT RIVER							
Gibbons Pass	7100	1/30	60	15.1	22.0	15.1	
Lolo Pass	5230	1/29	80	20.5	25.6	-	
Moose Creek	6200	1/30	48	13.8	15.2	10.9	
Saddle Mountain	7940	1/30	65	17.2	25.1	-	
Saddle Mountain Pillow	7900	1/30	SP	17.8	26.9	-	
Savage Pass	6600	1/30	62	15.8	23.3	-	
Twelvemile Creek	5600	2/03	68	16.6	18.9	-	
Twelvemile Creek Pillow	5600				16.4	-	

SP - Snow pillow observation - water content only.



SNOW			THIS YEAR		PAST R	ECORD
DRAINAGE BASIN and/or SNOW COURSE	Date	Snow Depth	Water Content	Water Content (inches)		
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average

MISSOURI RIVER BASIN									
BEAVERHEAD RIVER									
Camp Creek Carter Creek Kilgore Lakeview Canyon Lakeview Ridge Sawtelle Mountain	6800 7400 6200 6930 7400 8715	1/28 1/31 1/28 1/30 1/30 1/28	25 20 36 22 21 80	6.2 4.2 9.8 5.6 5.5 23.8	14.5 4.2 14.8 18.4 15.5 41.5	6.3 2.8 6.2 8.3 7.7			
Copper Mountain Nez Perce Creek Picnic Grounds Pipestone Pass Rocker Peak Rocker Peak Pillow Uncle Sam Gulch MADISON RIVER	7700 6500 6500 7200 8000 8000 6500	2/02 2/02 2/03 1/28 2/02 2/02 2/02	27 16 12 10 39 SP 23	6.1 3.3 2.3 2.5 10.0 9.8 4.7	8.8 6.1 4.6 5.3 13.8 13.1 8.7	- 3.1 3.4 - -			
Big Springs Black Canyon Black Moose Hebgen Dam Island Park Lake Creek Latham Springs Lion Mountain Lucky Dog Meridian Creek Norris Basin Old Road Poachers Cabin Soap Bogus Divide Targhee Pass Tepee Creek Valley View West Yellowstone West Yellowstone Pillow	6500 7850 8125 6550 6315 6100 7650 8760 6900 7000 7500 7250 8000 7600 7000 8000 6500 6700	1/28 1/29 1/29 2/03 1/28 1/29 1/29 1/29 1/29 1/29 1/29 1/30 1/28 1/29 1/28 2/03 1/29	62 82 97 37 54 26 86 56 74 28 36 80 79 43 39 46 40 34 SP	16.3 22.8 27.8 9.1 12.6 5.4 23.2 12.8 19.4 5.8 7.9 21.6 23.2 9.5 8.2 11.0 8.6 8.4 5.2	21.3 30.4 39.0 11.6 19.4 8.6 30.8 22.2 25.4 13.5 8.6 28.0 29.8 16.2 20.7 20.0 22.4 13.4 10.2	13.1 23.1 26.8 7.5 10.6 - 22.4 - 16.8 - 7.2 17.5 23.8 - - - 10.3 7.4			
ST. MARY RIVER Hudson Bay Divide	5800	1/28	35	8.6	-	-			

SP - Snow pillow observation - water content only.



SNOW		THIS YEAR	Y	PAST RECORD			
DRAINAGE BASIN and/or SNOW COURSE		Date	Snow Depth	Water Content	Water Content (inches)		
NAME	Elevation	of Survey	(Inches)	(Inches)	Last Year	Average	
GALLATIN RIVER							
Arch Falls	7350	1/30	41	11.6	10.0	7.5	
Bridger Bowl	7250	1/29	87	25.5	22.0	16.1	
Bridger Bowl Pillow	7250	1/29	SP	24.3	21.1	15.6	
Devils Slide	8100	1/30	66	19.6	15.8	13.2	
Hood Meadow	6600	1/30	36	10.8	7.8	5.8	
Hood Meadow (New)	6600	1/30	39	11.9	8.5	6.5	
Lick Creek	6860	1/30	34	9.6	6.9	6.3	
Lick Creek Pillow	6860	1/30	SP	8.3	6.2	5.7	
Maynard Creek	6210	1/29	57	16.4	14.5	-	
Maynard Creek Pillow	6210	1/29	SP	12.8	10.4	-	
New World	6700	1/28	41	10.2	8.3	6.4	
Shower Falls	8100	1/30	76	23.2	19.5	16.0	
Shower Falls Pillow	8100	1/30	SP	19.8	17.6	14.1	
Twenty-One Mile	7150	2/04	46	11.4	21.8	11.9	
MISSOURI RIVER (Main Stem)							
Bear Paw Ski Area	5200	1/30	27	6.4	4.8	-	
Chessman Reservoir	6200	1/30	9	1.8	5.8	2.6	
Rocky Boy	4700	1/30	20.	3.4	3.9	-	
Rocky Boy Pillow	4700	1/30	SP	3.3	3.0	-	
Ten Mile Lower	6600	1/30	16	3.1	8.8	4.6	
Ten Mile Middle	6800	1/29	25	5.4	11.2	6.9	
Ten Mile Upper	8000	1/29	32	8.1	14.7	8.8	
SUN-TETON-MARIAS RIVERS							
Badger Pass	6900	2/05	101	25.0A	37.0A	-	
Blue Lake	5900	2/05	57	12.5A	-	-	
UPPER YELLOWSTONE							
Canyon	7750				14.8	10.1	
Grizzly Peak	8400	1/29	40	10.4	7.5	10.1	
Lake Camp	7850				10.4	5.9	
Lodgepole	8200	1/29	32	7.0	-	6.9	
Lupine	7300				12.3	7.1	
Northeast Entrance	7400	1/31	30	7.4	8.6	6.0	
Northeast Entrance Pillow	7400				8.5	-	
Sylvan Pass	7100	1/30	42	8.9	12.2	8.8	
Thumb Divide	7900	2/01	55	12.3	23.0	14.6	
West Rosebud	7500	1/28	25	5.3	10.0	-	

A - Aerial observation - water content only.

SP - Snow pillow observation - water content only.



DRAINAGE BASIN and/or STATION Name Elevation		e (Inches)	Date of	Soil Moisture (Inches)		
Elevation	Depth	Capacity	Survey	This Year	Last Year	Average †
COLUMBIA RI	VER BAS	IN				
3800	48.	7.5	No Mea	suremen	t	-
3000	48	22.6	2/02	19.3	19.0	19.6
3050	48	23.0				-
5600	54	8.4	1/30	6.4	8.7	7.1
5250	54	6.5	1/29	4.6	5.4	5.1
7100	48	10.0	1/30	7.2	8.7	7.4
4030	48	11.9	•		8.3	7.1
7260	48	10.8	No Measurement			-
7100	48	7.1	1/30	3.3	5.8	5.5
5250	48	10.6	2/05	5.1	6.5	6.6
MISSOURI RIV	VER BAS	IN				
6700	48	15.3	2/02	5.7	6.2	7.0
6700	48	6.5	1/29	2.0	3.5	_
	3800 3000 3050 5600 5250 7100 4030 7260 7100 5250 MISSOURI RIV	COLUMBIA RIVER BAS 3800 48 3000 48 3050 48 5600 54 5250 54 7100 48 4030 48 7260 48 7100 48 5250 48 MISSOURI RIVER BAS 6700 48	COLUMBIA RIVER BASIN 3800 48 7.5 3000 48 22.6 3050 48 23.0 5600 54 8.4 5250 54 6.5 7100 48 10.0 4030 48 11.9 7260 48 10.8 7100 48 7.1 5250 48 10.6 MISSOURI RIVER BASIN 6700 48 15.3	COLUMBIA RIVER BASIN	COLUMBIA RIVER BASIN Survey This Year	COLUMBIA RIVER BASIN Survey This Year Last Year

7250

4856

6860

7150

7420

6350

3950

4700

6020

7350

48

54

48

48

48

48

48

36

48

48

-9-

17.0

14.5

18.8

10.0

11.8

5.9

20.9

10.1

17.6

9.4

1/29

2/03

1/30

1/29

1/30

1/30

1/30

1/30

1/29

16.7

17.1

6.5

6.3

3.3

9.4

6.8

12.7

14.2 12.2

16.6

16.6

6.9

7.4

4.1

14.5

7.7

15.8

10.0

3.5

7.2

4.1

12.9

6.7

Gallatin

Bridger Bowl

College Site

Twenty-One Mile

Missouri Main Stem

Lick Creek

Kings Hill

Milk

Stemple Pass

Beaver Creek

Yellowstone

Battle Ridge

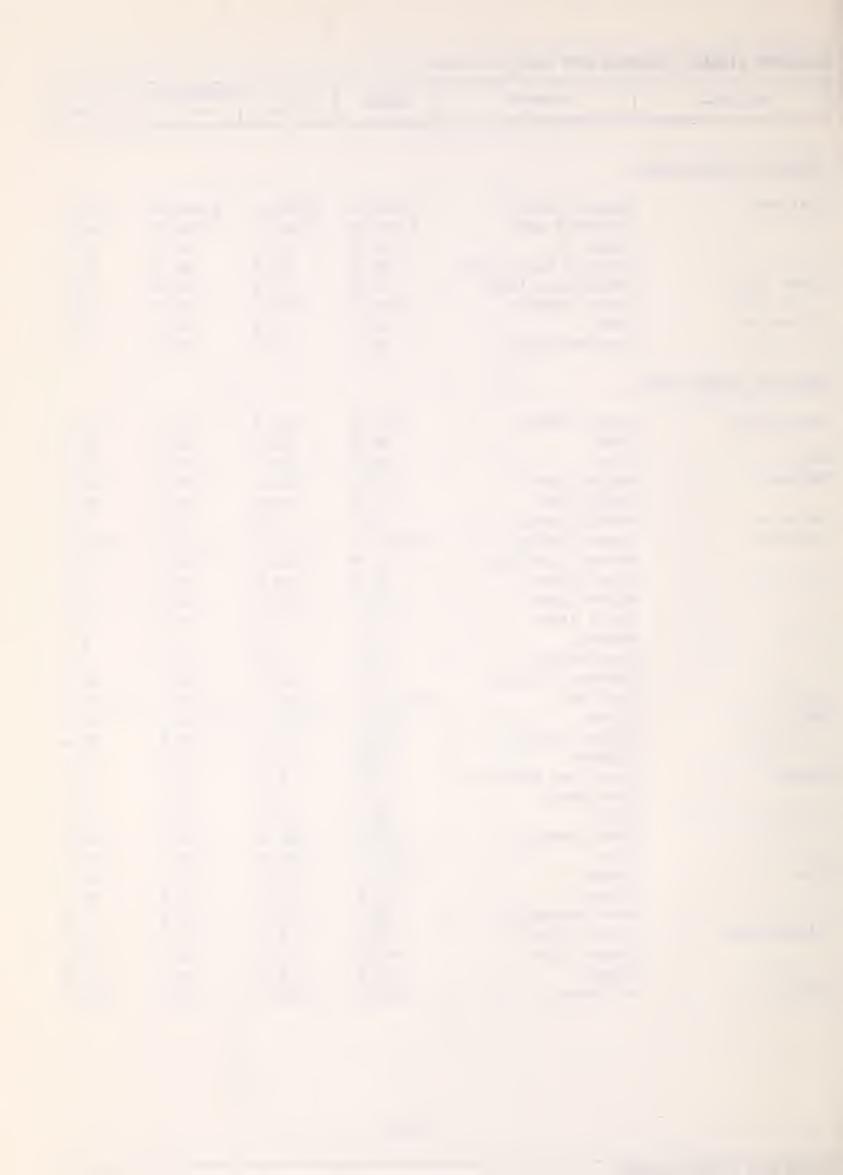
Northeast Entrance

Rocky Boy



RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH

		Usable		Usable Storage	
Basin or Stream	RESERVOIR	Capacity	This Year	Last Year	Average
COLUMBIA RIVER BASII	N				
E1 atherd	II	2 / 20 0	2 026 0	2 002 0	2 474 0
Flathead	Hungry Horse Flathead Lake	3,428.0 1,791.0		•	•
	Camas (4)	45.2	•	14.3	•
	Mission Valley (8)	100.3		80.2	31.0
Clark Fork	Georgetown Lake	31.0	13.8	29.4	25.1
Clair for	Noxon Rapids	334.6			
Bitterroot	Como	34.9			
Biccorroot	Painted Rocks	31.7	21.0	29.4	21.7
		0 _ 0 .		_,,,	2-0.
MISSOURI RIVER BASII	<u> </u>				
Beaverhead	Clark Canyon	328.9	141.9	152.8	126.5
	Lima	84.0	50.6	44.9	22.8
Ruby	Ruby	38.8	29.7	27.8	21.1
Madison	Hebgen Lake	377.5	266.4	299.5	168.7
	Ennis Lake	41.0	34.8	35.4	38.4
Gallatin Gallatin	Middle Creek	8.0	3.8	3.5	3.3
Missouri	Canyon Ferry	2,043.0	1,677.0	1,649.0	1,602.0
	Hauser & Helena	61.9	60.7	63.0	56.5
	Lake Helena	10.4	10.0	10.9	8.6
	Holter Lake	81.9	81.8	51.2	61.5
	Smith River	10.7	4.9	8.0	5.7
	Durand	7.0	3.2	6.1	4.0
	Martinsdale	23.1	4.8	10.6	6.3
	Deadman's Basin	72.2		46.6	
	Fort Peck		16,340.0		
Sun	Gibson	105.0			
	Willow Creek	32.3			
26	Pishkun	32.0			
Marias	Lower Two Medicine		5.0		
	Four Horns		12.7		
	Swift	30.0			
	Lake Frances	112.0			
M2 11.	Tiber	1,347.0			
Mi1k	Fresno		69.7	45.2	
	Nelson	66.8 66.1		26.9	
Yellowstone	Lake Sherburne Mystic Lake	20.8			
Tellowstone	Tongue River		24.6		
	Cooney	27.5			
Big Horn	Yellowtail	1,356.0			
-6		_,000,0	0,0,0		



SUMMARY OF SNOW MEASUREMENTS (COMPARISON WITH PREVIOUS YEARS)

RIVER BASIN and/or SUB-WATERSHED

Number of Courses Averaged

Number of Last YEAR'S SNOW WATER AS PERCENT OF:

Average



Agencies and Organizations Cooperating in Montana Snow Surveys

- U. S. Forest Service
 Region I, Missoula, Montana
 Montana Forests and Ranger
 Districts
- U. S. Geological Survey Helena, Montana Portland, Oregon
- U. S. Army Corps of Engineers Portland, Oregon Seattle, Washington Walla Walla, Washington Omaha, Nebraska
- U. S. Indian Irrigation Service St. Ignatius, Montana
- U. S. Weather Bureau Helena, Montana Portland, Oregon Kansas City, Missouri
- U. S. Bureau of Sports Fisheries and Wildlife Red Rock Lakes Refuge Monida, Montana
- U. S. Bureau of Reclamation Billings, Montana Boise, Idaho
- U. S. Bonneville Power Administration Portland, Oregon

- U. S. Soil Conservation Service Montana, Wyoming, Idaho
- Soil and Water Conservation Districts Montana Counties
- U. S. National Park Service Yellowstone National Park Glacier National Park
- Montana Power Company Butte, Montana
- Montana Water Resources Board Helena, Montana
- North Montana Branch Station Agricultural Experiment Station Havre, Montana
- Montana State University
 Agricultural Experiment Station
 Bozeman, Montana
- University of Montana School of Forestry Missoula, Montana
- Water Rights Branch, Dept. of Lands and Forests Victoria, British Columbia
- Department of Energy, Mines and Resources Calgary, Alberta

UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE P. O. Box 98

BOZEMAN, MONTANA 59715

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Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

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